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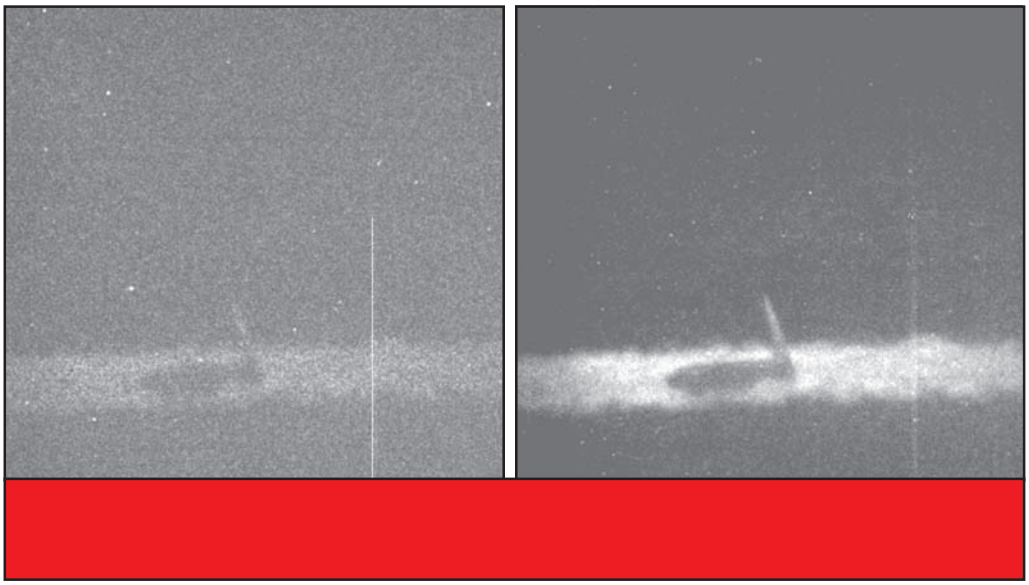
Success Story

ERASER - ENHANCED RECOGNITION AND SENSING RADAR SENSOR



A new image enhancement technique increases sensor identification ranges, allowing pilots to target and attack from greater standoff ranges, thereby reducing aircrew and aircraft risk. Computation improvements should increase the identification range performance of the Enhanced Recognition and Sensing Radar (ERASER) sensor by a factor of two or more for the observer and/or the automatic recognition and cueing systems. The algorithm developed during this project has great transition potential for imaging sensors used and developed by the Air Force.

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Accomplishment

A team of researchers from the Sensors Directorate, Wyle Laboratory, and Optimetrics developed image-processing software to enhance the image quality and performance of a new laser identification technology known as the ERASER. ERASER uses a laser to illuminate the target area and a high-resolution camera to collect the reflected laser energy and obtain a clear picture of the area. ERASER increased the identification range with no additional hardware modifications. The team also developed a computer model that predicts the performance of the ERASER for a variety of atmospheric, sensor, and laser combinations and scenarios.

Background

Previous laser radar technology generated images much like a television, with two mirrors scanning a laser beam and building the picture one pixel, or picture element, at a time. This technology is only suitable for short-range applications. The cost of beam pointing and stabilization at longer ranges is prohibitive for scanning systems.

Instead of building an image one pixel at a time, ERASER works like a regular camera taking a snapshot of the potential target area. New algorithms provide electronic image stabilization using pixel-based registration while improving image resolution using frame averaging.

Engineers used a variety of filtering algorithms to eliminate spatial noise. The engineers also minimized the computational requirements for these algorithms to allow real-time implementation using commercial off-the-shelf (COTS) processors.

The team built a COTS processor, which is compatible with the ERASER and automatic target recognition systems, to implement these algorithms for the field and flight demonstrations. The team also worked with Raytheon developing a performance model applicable to the ERASER sensor system. The team upgraded the model to provide results with a much higher confidence factor after conducting extensive research on the sensor, laser, and various atmospheric parameters.

Sensors
Emerging Technologies

Additional information

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